

CLAIMS

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1. (Amended) A molecular binding method comprising steps of: preparing a support having fixed thereon an intermediate excitation medium the composition of which is the same before and after excitation and after transfer of excitation energy or electrons;

arranging said intermediate excitation medium on said support so as to face at a specific distance either one or both of a first molecule having a binding residue and a binding target to be bound to said first molecule; and

binding said first molecule, which is in the vicinity of said intermediate excitation medium which has been excited, with said binding target by supplying external energy to said intermediate excitation medium so as to excite said intermediate excitation medium.

2. (Amended) The molecular binding method according to Claim 1, wherein said step of binding is a step of binding with either one or both of said first molecule and said binding target fixed on a fixing member.

3. (Amended) The molecular binding method according to Claim 2, wherein said step of preparing a support is a step of preparing a support having a relief or uneven pattern, the pattern having provided thereon with said intermediate excitation medium, and wherein said step of binding is a step which uses, of said intermediate excitation medium which has

been excited, only said intermediate excitation medium on the protruding parts of said relief or uneven pattern.

4. (Amended) The molecular binding method according to Claim 2, wherein said step of preparing a support is a step of preparing a support having one or more than one of said intermediate excitation medium fixed on the tip thereof, and wherein said step of binding is a step of using said intermediate excitation medium which has been excited on said tip.

5. (Amended) The molecular binding method according to any one of Claims 2 through 4, wherein said binding is accomplished with said support positioned accurately enough with respect to said fixing medium so as to achieve said binding.

6. (Amended) The molecular binding method according to Claim 5, wherein said binding is accomplished with said accuracy of 1 nm or less.

7. (Amended) The molecular binding method according to any one of Claims 1 through 6, wherein said binding is accomplished by means of binding energy which moves from said intermediate excitation medium which has been excited to said first molecule.

8. (Amended) The molecular binding method according to Claim 7, wherein movement of binding energy from said intermediate excitation medium to said first molecule is

accomplished by excited triplet energy transfer.

9. (Amended) The molecular binding method according to any one of Claims 1 through 6, wherein said binding is accomplished due to transfer of electrons between said intermediate excitation medium which has been excited and said first molecule.

10. (Amended) The molecular binding method according to any one of Claims 1 through 9, wherein said external energy is supplied by supplying light, electrons or ions to said intermediate excitation medium.

11. (Amended) The molecular binding method according to Claim 10, wherein, when said intermediate excitation medium is a photosensitized molecule, said external energy is supplied by exposure to said light.

12. (Amended) The molecular binding method according to Claim 11, wherein a N-acetyl-4-nitro-1-naphthylamine derivative is used as said photosensitized molecule.

13. (Amended) The molecular binding method according to Claim 9, wherein, when said intermediate excitation medium is a photocatalyst, said external energy is supplied by exposure to said light.

14. (Amended) The molecular binding method according to Claim 13, wherein titanium dioxide is used as said photocatalyst.

15. (Amended) The molecular binding method according to

any one of Claims 1 through 14, wherein a second molecule having a binding residue is used as said binding target.

16. (Amended) The molecular binding method according to any one of Claims 1 through 14, wherein a material body other than a molecule is used as said binding target.

17. (Amended) A molecular binding device comprising:  
an intermediate excitation medium the composition of which is the same before and after excitation and after transfer of excitation energy or electrons;

a support on which the intermediate excitation medium is fixed and on which the intermediate excitation medium faces at a specific distance either one or both of a first molecule having a binding residue or a binding target to be bound to said first molecule; and

an external energy supply source which supplies external energy which excites said intermediate excitation medium and causes said first molecule in the vicinity of said intermediate excitation medium which has been excited to bind to said binding target.

18. (Amended) The molecular binding device according to Claim 17, wherein either one or both of said first molecule and said binding target is fixed to a fixing member.

19. (Amended) The molecular binding device according to Claim 18, wherein said support is a support having a relief or uneven pattern provided with said intermediate excitation

medium.

20. (Amended) The molecular binding device according to Claim 18, wherein said support is a support with one or more than one of said intermediate excitation medium fixed to the tip thereof.

21. (Amended) The molecular binding device according to any one of Claims 18 through 20, wherein said support is positioned accurately enough with respect to said fixing member so as to achieve said binding.

22. (Amended) The molecular binding device according to Claim 21, wherein said accuracy is 1 nm or less.

23. (Amended) The molecular binding device according to any one of Claims 17 through 22, wherein said intermediate excitation medium which has been excited generates binding energy which moves from said intermediate excitation medium which has been excited to said first molecule to achieve said binding.

24. (Amended) The molecular binding device according to any one of Claims 17 through 22, wherein said intermediate excitation medium which has been excited accomplishes said binding by transfer of electrons between said intermediate excitation medium which has been excited and said first molecule.

25. (Amended) The molecular binding device according to any one of Claims 17 through 24, wherein said external energy

is light, electrons or ions.

26. (Amended) The molecular binding device according to Claim 25, wherein, when said intermediate excitation medium is a photosensitized molecule, said external energy is said light.

27. (Amended) The molecular binding device according to Claim 26, wherein said photosensitized molecule is a N-acetyl-4-nitro-1-naphthylamine derivative.

28. (Amended) The molecular binding device according to Claim 25, wherein, when said intermediate excitation medium is a photocatalyst, said external energy is said light.

29. (Amended) The molecular binding device according to Claim 28, wherein said photocatalyst is titanium dioxide.

30. (Amended) The molecular binding device according to any one of Claims 17 through 29, wherein said binding target is a second molecule having a binding residue.

31. (Amended) The molecular binding device according to any one of Claims 17 through 29, wherein said binding target is a material body other than a molecule.

32. (Added) The molecular binding device according to any one of Claims 17 through 31, wherein said intermediate excitation medium is fixed to said support by chemical bonds.

33. (Added) The molecular binding device according to any one of Claims 17 through 32, wherein said binding residue is an aliphatic residue having an unsaturated double bond or unsaturated triple bond.

34. (Added) The molecular binding device according to any one of Claims 17 through 32, wherein said binding residue is an aromatic residue having an unsaturated double bond or unsaturated triple bond.

35. (Added) The molecular binding device according to Claim 34, wherein, when said aromatic residue having said unsaturated double bond is a cinnamic acid residue, said intermediate excitation medium is N-[3-{3,5-bis{3,5-bis[3,5-bis(4-mercaptobenzylthio)benzylthio]benzylthio}benzyloxy}-propionyl-4-nitro-1-naphthylamine.

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1. A molecular binding method wherein external energy is supplied to an intermediate excitation medium fixed on a support to excite said intermediate excitation medium, thereby binding a first molecule having a binding residue, which is in the vicinity of said intermediate excitation medium which has been excited, with a binding target to be bound to said first molecule.

2. The molecular binding method according to Claim 1, wherein said binding is accomplished with either one or both of said first molecule and said binding target fixed to a fixing member.

3. The molecular binding method according to Claim 2, wherein said binding is accomplished with said support positioned accurately enough with respect to said fixing member so as to achieve said binding.

4. The molecular binding method according to Claim 3, wherein said binding is accomplished with said accuracy of 1 nm or less.

5. The molecular binding method according to any one of Claims 1 through 4, wherein said binding is accomplished by means of binding energy which moves from said intermediate excitation medium which has been excited to said first molecule.

6. The molecular binding method according to Claim 5,



wherein movement of binding energy from said intermediate excitation medium to said first molecule is accomplished by excited triplet energy transfer.

7. The molecular binding method according to any one of Claims 1 through 4, wherein said binding is accomplished due to transfer of electrons between said intermediate excitation medium which has been excited and said first molecule.

8. The molecular binding method according to any one of Claims 1 through 7, wherein said external energy is supplied by supplying light, electrons or ions to said intermediate excitation medium.

9. The molecular binding method according to Claim 8, wherein, when said intermediate excitation medium is a photosensitized molecule, said external energy is supplied by exposure to said light.

10. The molecular binding method according to Claim 9, wherein a N-acetyl-4-nitro-1-naphthylamine derivative is used as said photosensitized molecule.

11. The molecular binding method according to Claim 7, wherein, when said intermediate excitation medium is a photocatalyst, said external energy is supplied by exposure to said light.

12. The molecular binding method according to Claim 11, wherein titanium dioxide is used as said photocatalyst.

13. The molecular binding method according to any one of

Claims 1 through 12, wherein a second molecule having a binding residue is used as said binding target.

14. The molecular binding method according to any one of Claims 1 through 12, wherein a material body other than a molecule is used as said binding target.

15. A molecular binding device comprising:  
a support;  
an intermediate excitation medium fixed on said support; and  
an external energy supply which supplies said intermediate excitation medium with external energy to excite said intermediate excitation medium, thereby binding a first molecule which has a binding residue and which is in the vicinity of said excited intermediate excitation medium with a binding target which is to be bound to said first molecule.

16. The molecular binding device according to Claim 15, wherein either one or both of said first molecule and said binding target is fixed to a fixing member.

17. The molecular binding device according to Claim 16, wherein said support is positioned accurately enough with respect to said fixing member so as to achieve said binding.

18. The molecular binding device according to Claim 17, wherein said accuracy is 1 nm or less.

19. The molecular binding device according to any one of Claims 15 through 18, wherein said intermediate excitation

medium which has been excited generates binding energy which moves from said intermediate excitation medium which has been excited to said first molecule to achieve said binding.

20. The molecular binding device according to any one of Claims 15 through 18, wherein said intermediate excitation medium which has been excited accomplishes said binding by transfer of electrons between said intermediate excitation medium which has been excited and said first molecule.

21. The molecular binding device according to any one of Claims 15 through 20, wherein said external energy is light, electrons or ions.

22. The molecular binding device according to Claim 21, wherein when said intermediate excitation medium is a photosensitized molecule, said external energy is said light.

23. The molecular binding device according to Claim 22, wherein said photosensitized molecule is a N-acetyl-4-nitro-1-naphthylamine derivative.

24. The molecular binding device according to Claim 21, wherein, when said intermediate excitation medium is a photocatalyst, said external energy is said light.

25. The molecular binding device according to Claim 24, wherein said photocatalyst is titanium dioxide.

26. The molecular binding device according to any one of Claims 15 through 25, wherein said binding target is a second molecule having a binding residue.

molecule having a binding residue.

27. The molecular binding device according to any one of Claims 15 through 25, wherein said binding target is a material body other than a molecule.

28. The molecular binding device according to any one of Claims 15 through 27, wherein said intermediate excitation medium is fixed to said support by chemical bonds.

29. The molecular binding device according to any one of Claims 15 through 28, wherein said binding residue is an aliphatic residue having an unsaturated double bond or unsaturated triple bond.

30. The molecular binding device according to any one of Claims 15 through 28, wherein said binding residue is an aromatic residue having an unsaturated double bond or unsaturated triple bond.

31. The molecular binding device according to Claim 30, wherein, when said aromatic residue having said unsaturated double bond is a cinnamic acid residue, said intermediate excitation medium is N-[3-{3,5-bis{3,5-bis[3,5-bis(4-mercaptobenzylthio)benzylthio]benzylthio}benzyloxy}-propionyl-4-nitro-1-naphthylamine.